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IS 3121 (1981): Rigging Screws and Stretching Screws [MED
10: Wire Ropes and Wire Products]



“ज्ञान से एक नये भारत का निर्माण”

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“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

SPECIFICATION FOR RIGGING SCREWS AND STRETCHING SCREWS

(First Revision)

1. Scope — Specifies materials, components, dimensions, finishing and tests for rigging screws and stretching screws (double-ended and single-ended), of the following nominal sizes:

- a) Rigging screws: M12 to M90, and
- b) Stretching screws: M6 to M52.

2. Terminology — For the purpose of this standard, the following definitions shall apply.

2.1 Rigging Screw — A tubular body threaded internally at each end in opposite hand and into which end fittings of optional form (for example, elongated eye, stud eye, screwed fork jaw) having screwed shanks are fitted.

2.2 Stretching Screw — An open body consisting of two reins connecting a box at each end, with a central hole threaded in opposite hand, into which fittings of optional form (for example, stud eye, elongated eye, screwed fork jaw) having screwed shanks are fitted.

2.3 Single-Ended Stretching Screw — An open body with a swivel fitted at one end and screwed internally at the other.

2.4 Double-Ended Stretching Screw — An open body, the solid ends of which are internally screwed, one right-hand and the other left-hand.

3. Shape and Dimensions

3.1 Rigging Screws

3.1.1 The shapes and dimensions of rigging screws, tubular body screwed eye, screwed fork and screwed stud eye shall be as shown in Tables 1, 2, 3, 4 and 5 respectively.

3.1.2 The dimensions of the bolts and nuts shall comply with the requirements specified in IS : 1363-1967 'Specification for black hexagonal bolts, nuts and lock nuts (dia 6 to 39 mm) and black hexagonal screws (dia 6 to 24 mm) (first revision)' in respect of sizes from 6 to 39 mm and with those specified in IS : 3138-1966 'Specification for hexagonal bolts and nuts (M42 to M150)' in respect of sizes beyond 39 mm. The bolt heads and nuts shall be of lock-nut thickness for sizes up to 39 mm. The bolts and nuts shall be fitted with a split cotter pin conforming to IS : 549-1974 'Specification for split pins (second revision)' positioned outside the nut.

3.2 Stretching Screws

3.2.1 The shapes and dimensions of open body, screw eyes and swivel eyes shall be as shown in Table 6.

3.2.1.1 The dimensions given in Table 6 for the cross-section of the sides of the body are such that the combined cross-sectional area is about twice the area at the bottom of the thread of the screw eye shank.

3.3 Tolerances

3.3.1 The permissible variation from any of the dimensions given in Tables 1 to 6 shall not exceed ± 5 percent, except that steel tube used for tubular body shall have the tolerances as specified in IS : 1161-1979 'Specification for steel tubes for structural purposes (third revision)'.

3.3.2 The screw threads on the eye and fork ends in the tubular body and on the screw eyes shall (after galvanizing for screw eyes and other parts when so specified) conform to the coarse tolerance class specified in IS : 4218 (Part IV) - 1976 'ISO metric screw threads : Part IV Tolerancing system' (issued in six parts).

Adopted 26 November 1981

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Gr 5

INDIAN STANDARDS INSTITUTION
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4. Material

4.1 Rigging Screws

4.1.1 Tubular body — The tubular body shall be made from hot-finished steel tubing having a minimum tensile strength of 345 N/mm².

4.1.1.1 Alternatively, the tubes may be either cold-drawn seamless, or electric resistance welded, having a minimum tensile strength of 315 N/mm².

4.1.2 For tubular bodies, if machined from the solid, material shall conform to Designation C20 of IS : 1570 - 1961 'Schedules for wrought steels for general engineering purposes'.

4.1.3 Screwed eye, screwed fork and screwed stud eye — The screwed eye, screwed fork and screwed stud eye shall be weldless, and their material shall conform to Designation C20 of IS : 1570 - 1961.

4.2 Stretching Screw

4.2.1 The body, the screw eyes and swivel eyes shall be weldless, and shall be made of steel conforming to Designation C20 of IS : 1570 - 1961.

4.2.2 The screwed collar nut for the swivel eye may be made from hot-finished seamless steel tube.

4.3 Bolts and Nuts — Bolts and nuts fitted to secure the thimble in the fork shall be made from open-hearth steel complying with the requirements of either IS : 226 - 1975 'Specification for structural steel (standard quality) (fifth revision)' or conforming to Designation C20 of IS : 1570 - 1961. In either case, the steel shall have a minimum tensile strength of 440 N/mm² and a maximum strength of 520 N/mm².

5. Construction

5.1 Rigging screws shall consist of a tubular body, with both ends screwed internally for the screwed shanks of the end fittings, one end being threaded right-hand and the other left-hand.

5.1.1 The assembly of the rigging screw (see Table 1) shall be either of the following:

- a) A tubular body (see Table 2) fitted at each end with an elongated screw eye (see Table 3); or
- b) A tubular body, fitted at one end with an elongated screw eye, including a shackle with a bolt, nut and split cotter pin; and at the other end with a fork (see Table 4), including a solid wire rope thimble secured by means of a bolt, nut and split cotter pin or a wire rope socket with a screwed stud eye (see Table 5).

5.2 Stretching screws of the double-ended type shall consist of a central open body provided with an identical short screw eye at each end, one screw eye being threaded right-hand and the other left-hand, as shown in the figure in Table 6. Stretching screws of the single-ended type shall consist of a central open body provided with a swivel eye at one end and a long right-hand screw at the other end, as shown in the figure in Table 6.

6. General Requirements

6.1 Thimbles used shall comply with the requirements for solid thimbles specified in IS : 2315-1978 'Specification for thimbles for wire ropes (first revision)' and sockets with IS : 2485-1979 'Specification for drop forged sockets for wire ropes for general engineering purposes (first revision)'.

6.2 Shackles shall be in accordance with IS : 6132-1971 'Specification for shackles' except that the heads and nuts shall be of lock-nut thickness, and the split cotter pin shall be positioned outside the lock-nut.

6.3 Heat Treatment — Tubular bodies, screw forks, screw stud eyes, screw eyes and swivel eyes shall be normalized after completion of all forging operations and before machining. A suitable normalizing treatment is to uniformly heat them in a furnace until the whole of the metal has attained a temperature between 880°C and 910°C. They are then withdrawn from the furnace and allowed to cool in still air.

6.4 Galvanizing — Unless specified, otherwise, all components of the assembled stretching screw and rigging screw shall be supplied galvanized. The galvanizing shall be carried out by the 'hot process' and shall consist of a continuous coating of zinc of a purity not less than 98.5 percent. The tolerances specified in 3.3 shall apply after galvanizing. All screw threads shall be 'brush' or 'spun' galvanized. The purchaser shall state clearly at the time of the enquiry and order whether he requires the zinc coating to be tested, and the number of samples to be tested.

Note — It is recommended that not more than one sample of each size of rigging screw per consignment should normally be subjected to this test.



AMENDMENT NO. 1 FEBRUARY 1986

TO

IS:3121-1981 SPECIFICATION FOR RIGGING SCREWS AND
STRETCHING SCREWS

(First Revision)

(Page 2, clause 6.4) - Substitute the following
for the existing clause:

'6.4 *Galvanizing* - Unless otherwise specified, all components of the assembled stretching screw and rigging screw shall be galvanized as per IS:4759-1979 'Hot-dip zinc coatings on structural steel and other allied products (*first revision*)'. The tolerances specified in 3.3 shall apply after galvanizing. All screw threads shall be 'brush' or 'spun' galvanized. The purchaser shall state clearly at the time of the enquiry and order whether he requires the zinc coating to be tested, and the number of samples to be tested.'

Note - It is recommended that not more than one sample of each size of rigging screws per consignment should normally be subjected to this test.'

(EDC 32)

Reprography Unit, ISI, New Delhi, India

6.5 Workmanship

6.5.1 Rigging screw

6.5.1.1 Body — The tubular body shall be neatly and cleanly made and finished. The ends of the body shall be swaged hot externally to cylindrical form to permit a screw thread of full depth when tapping. When made from the thinnest tube listed in Table 2, the ends of the body shall be 'up-set' by a forging operation to increase thickness of the tubing to the required value so that the value of dimension F (see Table 2) is maintained after swaging down. Alternatively, the body may be machined from solid bar.

6.5.1.2 Screwed eye, screwed fork and screwed stud eye — The screwed eye, screwed fork and screwed stud eye shall be cleanly forged and finished; all fins or flashes produced in forging shall be dressed to a level surface. The length of the thread on the fork and eye shanks shall be such that the ends meet at the centre of the body when they are screwed home.

6.5.1.3 Fork and thimble — The thimble, when in place in the fork, shall be capable of free movement.

6.5.2 Stretching screw

6.5.2.1 Body — The body shall be a solid forging without weld, neatly and cleanly made and finished. Flashes or fins produced in manufacture shall be dressed to a level surface. The faces of each boss of the body shall be machined.

6.5.2.2 Screw eye — The screw eye shall be a solid forging without weld, neatly made and finished. Flashes or fins produced in manufacture shall be dressed to a level surface. The length of the thread on the screwed shanks shall be such that the shank ends of the screw eyes, or screw eye and swivel, shall meet when screwed home.

6.5.2.3 Swivel eye — The swivel eye (see Table 6) shall be solid forging without weld neatly and cleanly made and finished. Flashes or fins produced in manufacture shall be dressed to a level surface. The shanks shall be machined and screwed (fine thread) and be provided with a tubular nut. The shoulder (dimension F) shall be machine-faced. The end of the screw shanks shall be riveted over the collar nut to form an effective head. The swivel eye shall swivel freely after assembly.

6.6 Each component of the completed rigging screw or stretching screw shall be free from any visible flaw or defect.

6.7 Certificate of Test — The manufacturer shall supply a certificate of test with every delivery of rigging screw or stretching screw in the form given in Appendix A.

7. Tests

7.1 Proof Testing — Each completed rigging screw or stretching screw shall be subjected to the appropriate proof load given in Table 1 or Table 6 which it shall withstand without any sign of defect.

7.2 Tests for Galvanizing — When specified otherwise by the purchaser, samples of each component of the completed rigging screw, including screw threads, shall be tested in accordance with IS : 2633-1972 'Methods of testing uniformity of coating on fine coated articles (first revision)' and IS : 6745-1972 'Methods for determination of weight of zinc coating on zinc coated iron and steel articles'.

8. Enquiry and Order

8.1 This standard provides for alternative designs and the enquiry and order should state the type of screw required by reference to the figures. When an assembly different from that shown in the figures is called for, or when lock-nuts are required, it is incumbent upon the purchaser to give full details of such special requirements.

8.2 The rigging screws shall be supplied in galvanized condition in case nothing is stated in the enquiry and order about the surface coating of the rigging screws.

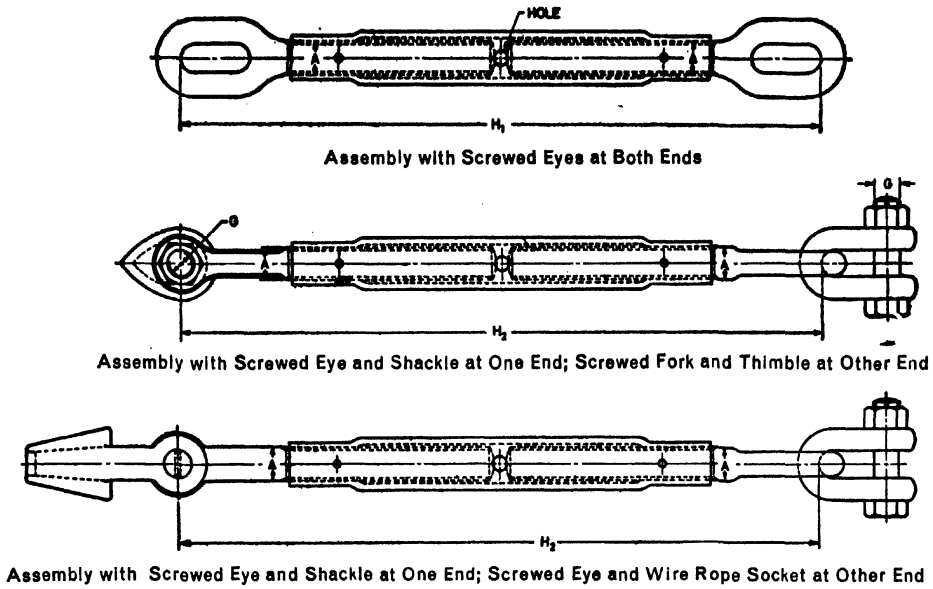
8.3 When lock-nuts are required, or if the stretching screws are required ungalvanized, this should be clearly stated in the enquiry and order.

9. Marking

9.1 Each rigging screw and stretching screw shall be permanently and legibly stamped with the safe working load given in Tables 1 and 6, and also with such marks and symbols as will allow identification with the manufacturer's Certificate of Test (see Appendix A). Care shall be taken that the stamps used have a concave surface where applicable and that the indentation is neither too sharp nor excessive in depth.

9.1.1 ISI Certification Marking — Details available with the Indian Standard Institution.

TABLE 1 DIMENSIONS FOR RIGGING SCREWS
(Clauses 3.1.1, 3.3.1, 5.1.1, 7.1 and 9.1)

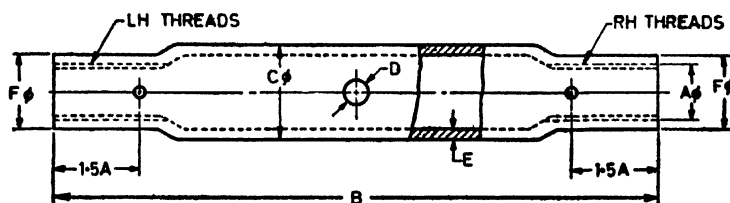


Nominal Size A	Dia of Rope	Nominal Dia of Bolt & Nut G	H ₁		H ₂		Proof Load	Safe Working Load
			Closed	Open	Closed	Open		
	mm	mm	mm	mm	mm	mm	kN	kN
M12	8	M12	330	525	330	525	10·0	5·0
M16	10	M14	370	550	370	550	18·0	9·0
M20	12	M16	400	570	400	570	28·0	14·0
M24	14	M20	475	700	475	700	36·0	18·0
M27	16	M22	550	825	550	825	44·0	22·0
M30	18	M27	550	825	550	825	63·0	31·5
M33	20	M30	600	875	600	875	75·0	37·5
M36	22	M30	600	875	610	875	86·0	43·0
M39	25	M33	660	960	660	960	100·0	50·0
M45	29	M39	700	960	700	960	112·0	56·0
M52	32	M45	750	1 000	750	1 000	144·0	72·0
M56	35	M52	775	1 025	760	1 000	194·0	97·0
M60	38	M52	800	1 050	780	1 025	214·0	107·0
M64	41	M58	1 070	1 450	1 050	1 420	288·0	143·0
M68	44	M64	1 120	1 590	1 100	1 500	342·0	171·0
M75	48	M70	1 270	1 700	1 240	1 680	400·0	200·0
M80	51	M76	1 360	1 760	1 330	1 730	500·0	250·0
M90	54	M85	1 440	1 860	1 400	1 820	624·0	312·0

TABLE 2 DIMENSIONS FOR TUBULAR BODIES

(Clauses 3.1.1, 3.3.1, 5.1.1 and 6.5.1.1)

All dimensions in millimetres.

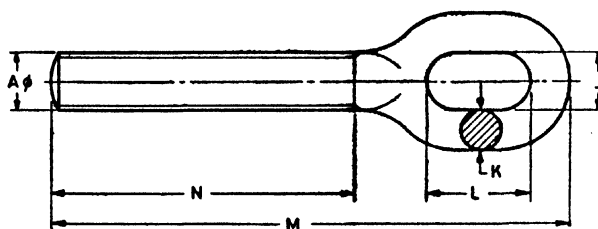


Nominal Size A	B	C Dia	D Dia	E	F Dia Min
M12	230	27	10	4	20
M16	230	27	10	4	22
M20	230	34	10	4	25
M24	300	34	12	5	32
M27	360	43	12	5.5	35
M30	360	43	14	5.5	38
M33	380	48	14	6.5	44
M36	380	60	16	6.5	47
M39	400	60	16	6.5	50
M45	400	76	19	6.5	60
M52	400	76	19	8	70
M56	400	83	19	8	73
M60	500	90	20	9.5	76
M64	580	95	20	13	91
M68	620	103	20	14	98
M75	660	111	20	14	103
M80	700	119	20	15	112
M90	740	127	20	16	122

TABLE 3 DIMENSIONS FOR SCREWED EYES

(Clauses 3.1.1, 3.3.1 and 5.1.1)

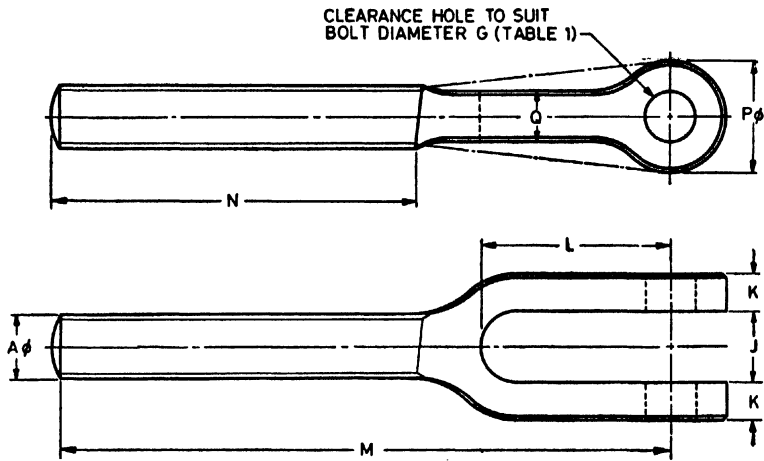
All dimensions in millimetres.



Nominal Size A	J	K Dia	L	M	N
M12	12	12	25	177	115
M16	18	12	44	197	115
M20	24	16	50	211	115
M24	24	16	50	246	150
M27	24	20	60	290	175
M30	30	20	60	290	175
M33	36	25	65	325	190
M36	36	25	65	325	190
M39	36	25	75	350	200
M42	42	28	90	378	200
M45	42	36	100	406	200
M56	54	36	110	421	200
M60	54	40	115	440	200
M64	60	47	137	580	290
M68	61	51	153	635	310
M75	69	57	170	690	330
M80	78	63	188	740	350
M90	88	69	206	790	370

TABLE 4 DIMENSIONS FOR SCREWED FORKS
(Clauses 3.1.1, 3.3.1 and 5.1.1)

All dimensions in millimetres.



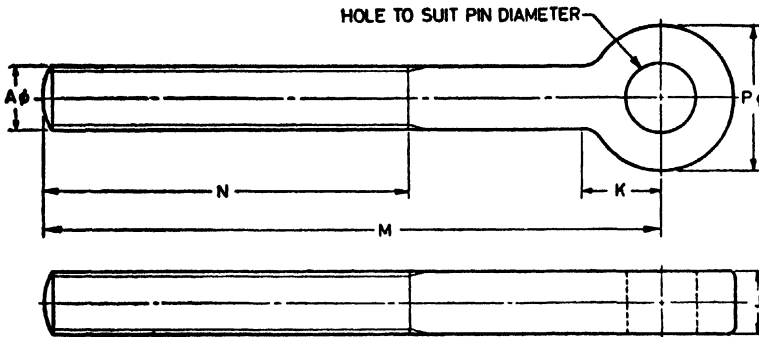
Nominal Size A Dia	J	K	L	M	N	P	Q*
M12	12	9.5	30	165	115	29	12
M16	19	9.5	50	185	115	32	12
M20	22	12	60	195	115	35	16
M24	25	12	65	240	150	42	19
M27	29	12	70	270	175	48	22
M30	32	14	75	280	175	54	25
M33	35	14	85	300	190	60	25
M36	39	16	90	315	190	60	29
M39	42	19	100	335	200	66	32
M45	52	22	115	350	200	80	38
M52	54	25	125	370	200	95	45
M56	60	29	125	375	200	100	48
M60	70	29	135	380	200	110	52
M64	60	26	135	508	290	127	52
M68	67	28	145	553	310	142	56
M75	73	30	160	596	330	157	64
M80	79	32	175	640	350	175	72
M90	84	34	190	684	370	193	76

* Permissible alternative form shown by dash-dot line in the figure.

TABLE 5 DIMENSIONS FOR SCREWED STUD EYES

(Clauses 3.1.1, 3.3.1 and 5.1.1)

All dimensions in millimetres.

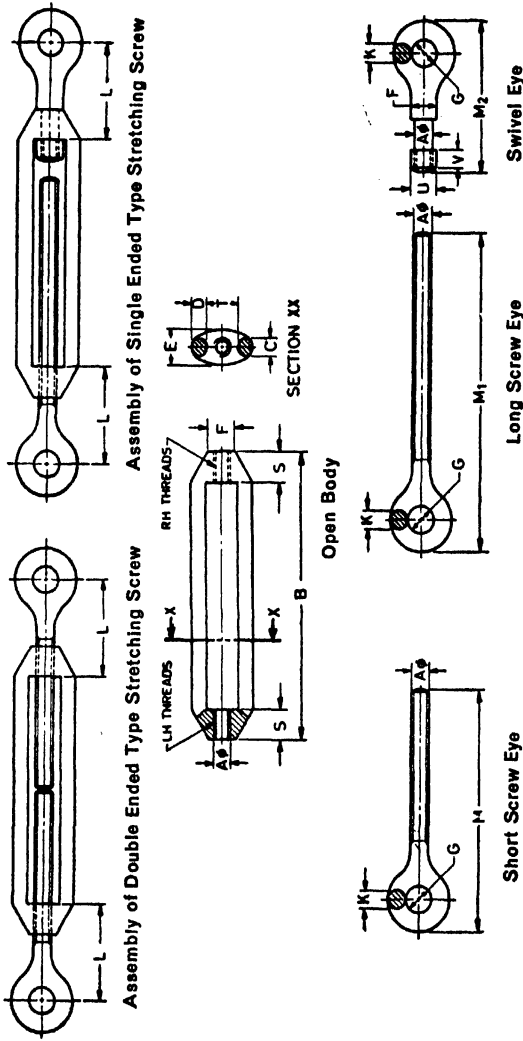


Nominal Size A Dia	J	K	M	N	P Dia	Pin Dia
M12	12	17	165	115	26	12.5
M16	16	22	185	115	40	19
M20	20	25	195	115	46	22
M24	24	25	230	150	46	22
M27	25	25	270	175	52	25
M30	30	36	270	175	66	32
M33	33	36	300	190	66	32
M36	36	40	300	190	72	35
M39	39	40	325	200	78	38
M45	40	50	350	200	78	38
M52	47	57	370	200	88	43
M56	52	66	385	200	100	49
M60	56	73	400	200	108	52
M64	60	80	533	289	120	58
M68	66	89	584	310	132	64
M75	71	96	633	330	144	70
M80	77	105	677	350	156	76
N90	89	118	721	370	178	87

TABLE 6 DIMENSIONS FOR STRETCHING SCREWS

(Clauses 3.2.1, 3.2.1.1, 3.3.1, 5.2, 6.5.2.3, 7.1 and 9.1)

All dimensions in millimetres.



Nominal Size A	Assembly and Body								Screw Eyes and Swivel Eyes						Proof Safe Working Load kN		
	B	C	D	E	F	L	S	T	G	K	M	M ₁	M ₂	U	V	Load kN	Load kN
M6	100	6	5	12	9	32	10	11	9	6	80	105	50	9	6	2.0	1.0
M8	125	8	6	16	13	35	13	13	13	8	100	140	90	11	8	3.0	1.5
M10	160	10	8	19	15	45	15	15	16	10	130	180	75	13	10	6.0	3.0
M12	200	12	10	22	19	54	18	18	19	12	150	220	90	17	13	9.0	4.5
M14	225	15	12	25	22	60	21	22	22	12	175	250	105	19	14	12.0	6.0
M16	250	18	14	29	24	66	24	24	24	14	200	275	115	22	16	15.2	7.6
M20	315	20	16	33	30	80	30	30	30	16	230	325	135	26	20	22.4	11.2
M22	355	22	18	41	33	88	32	32	33	18	270	390	155	30	22	32.4	16.2
M24	400	24	20	43	36	100	35	35	36	18	310	435	175	34	24	40.0	20.0
M30	450	30	22	50	45	120	42	42	44	24	350	500	210	40	30	63.0	31.5
M36	450	36	28	60	55	135	50	50	52	28	380	510	250	49	36	90.0	45.0
M45	450	40	36	75	58	165	60	60	67	35	415	535	300	58	45	142	71
M52	450	45	40	100	75	190	70	70	80	42	450	535	340	65	52	190	95

APPENDIX A

(Clauses 6.7 and 9.1)

PRO FORMA FOR CERTIFICATE OF TEST

We hereby warrant that the $\frac{\text{rigging screw (s)}^*}{\text{stretching screw (s)}^*}$ supplied conform in all respects with IS : 3121 - 1981 and that each $\frac{\text{rigging screw}^*}{\text{stretching screw}^*}$ has been subjected to the proof load (.....kN) specified in Table $\frac{(1^*)}{(6^*)}$ of that standard, and was, after such test, duly examined by a competent person and found free from any visible defects.

The Identification mark on the $\frac{\text{rigging screw (s)}^*}{\text{stretching screw (s)}^*}$ is

.....

.....

Its safe working load is.....kN.....

Manufacturer

Signature.....

Date

EXPLANATORY NOTE

This standard, originally published in 1965, has been revised to introduce definitions of 'rigging screw' and 'stretching screw' and latest development in this field.

It is sometimes desirable to fit the threaded shanks of rigging screws and stretching screws with lock-nuts to prevent possible slacking back, for example, in the case of wire rope guys on derrick cranes. Where lock-nuts are required, this should be clearly specified in the enquiry or order.

The rigging screw assemblies specified are meant for normal conditions of use, but such assemblies may be varied. If desired, by fitting a fork at each end, or by fitting an ordinary thimble in place of solid thimble. It is incumbent upon the purchaser, however, to specify any such variations in the enquiry and order.

It is recommended that for normal conditions of service, the working load of the rigging screw or stretching screw should not exceed one-half the specified proof load. In all cases, however, where an assembly is made of various components, for example, screws, wire rope, shackles, etc, the safe working load of the assembly should be that of the weakest component in the assembly.

*Strike out what is not relevant.